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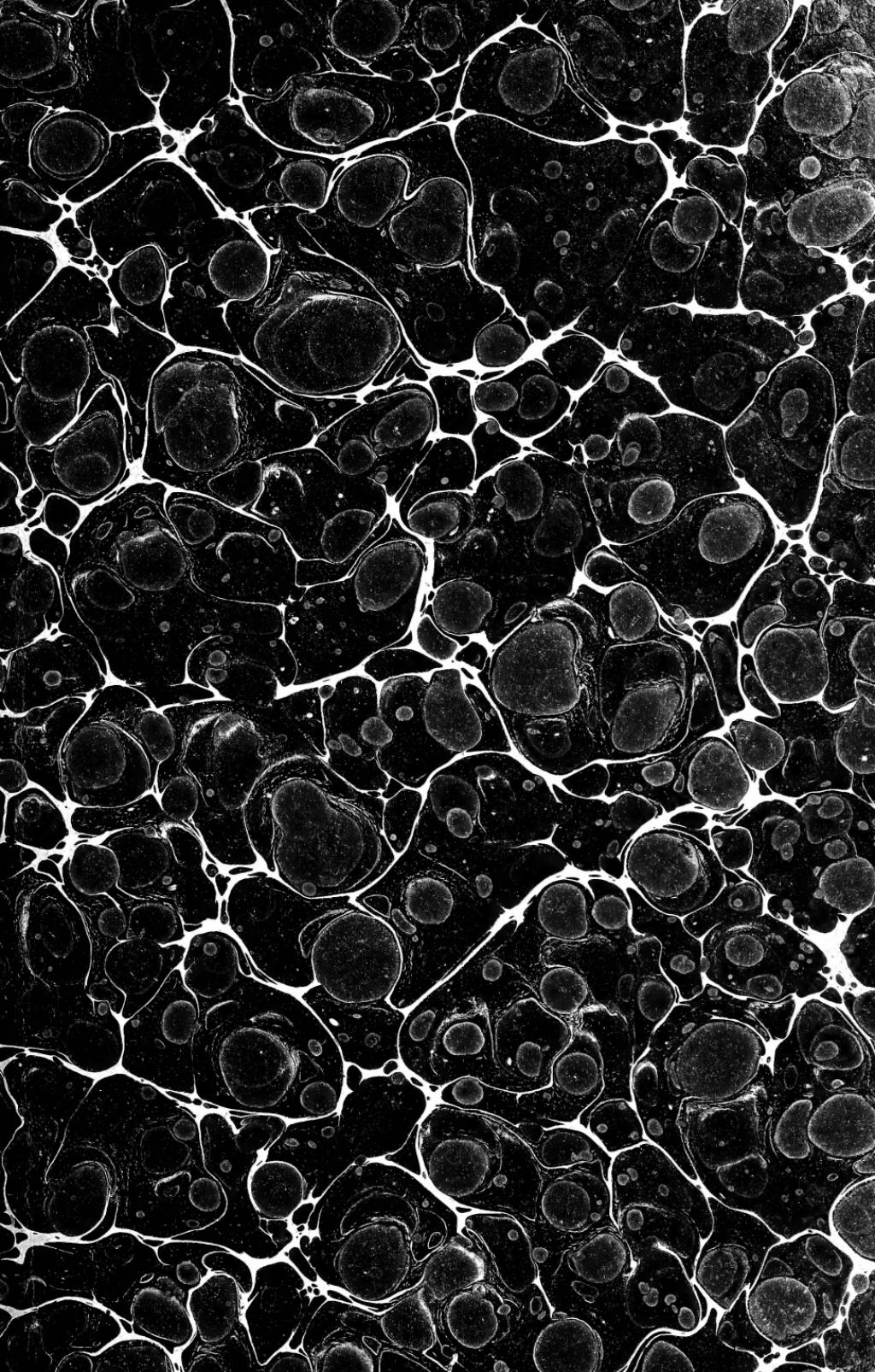
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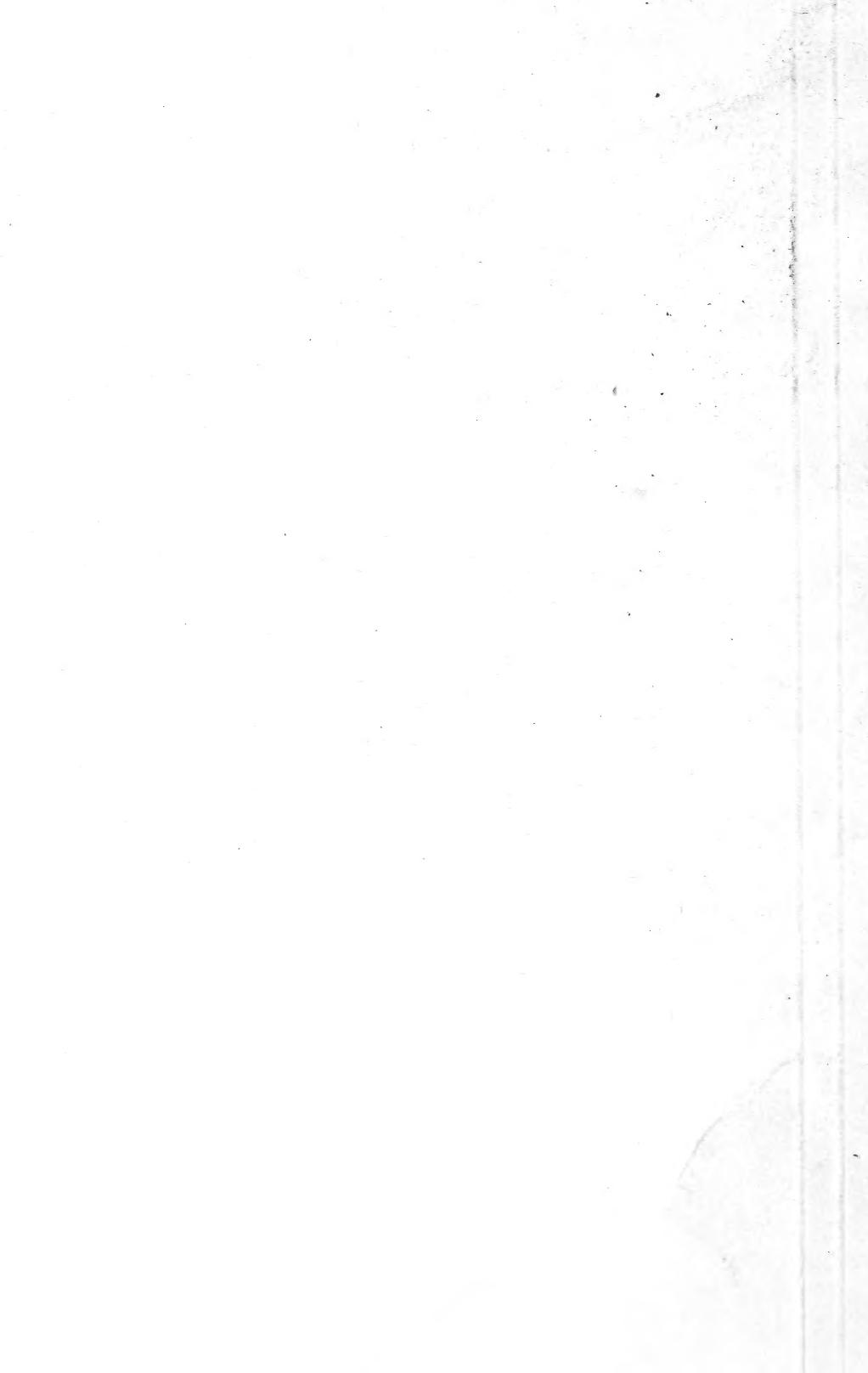
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United States Department of Agriculture,

BUREAU OF ENTOMOLOGY,

L. O. HOWARD, Entomologist and Chief of Bureau.

THE SLENDER SEED-CORN GROUND-BEETLE.

(*Clivina impressifrons* Lec.)

By F. M. WEBSTER,

In Charge of Cereal and Forage-Plant Insect Investigations.

The subject of this circular is a small, hard-bodied beetle belonging to the tribe Scaritini of the family Carabidae or ground beetles. The former name is derived from a word which means literally "a scratcher," and these beetles have been so designated on account of their widened, flattened, and toothed fore legs, adapting them for digging. They are generally believed to be both carnivorous and predaceous. About 220 species of this genus have been described, principally from the Tropics; of these some 22 inhabit America north of Mexico, while 18 of these 22 are known to occur in Louisiana and Texas. *Clivina planicollis* Lec., one of this number, is known also from Mexico, and *C. impressifrons*, here discussed, extends its range northward to Nebraska, northern Illinois, Michigan, and New York.



FIG. 1.—*Clivina impressifrons*: Adult or beetle. Enlarged (original).

DESCRIPTION OF THE INSECT.

The fully matured beetle is entirely of a reddish color and about one-fourth of an inch long (6.5 mm.), the shape of the body being as shown in figure 1. It may be recognized by the aid of the following brief technical description:

The lateral margin of the thorax attains the basal margin, middle tibiae with a spur on the outer side near the tip; anterior femora not dentate, thickened; paronychium elongated; vertex sulcate, head smooth, punctured behind, vertical groove deep and long.

Its earlier stages are as yet unknown, altho the larvæ must certainly be very abundant somewhere. We know nothing of its breeding habits, as it is the fully developed insect that does the injury.

INFESTS LOW-LYING, FLAT LANDS.

This beetle appears to depredate only in the lower, flatter lands, and the writer has in past years many times observed it in great numbers floating about on the surface of the water, in cornfields, on the level prairie country of Illinois, immediately after a severe rain storm in spring. It is in such localities that wireworms are most injurious, and it seems quite probable that a considerable part of the damage placed to the credit of the latter may be really due to this pest. Farmers are very often unable to account for their failure to get the seed corn to germinate, and not discovering the cause, they charge it up to wireworms. The writer knows no reason for the beetle's apparent partiality for the lower and usually darker lands, and can only surmise that it must find a greater or more easily accessible food supply in such localities, altho probably it is very often carried there in great numbers by the water. The same characteristic is to be observed in many other insects to which this drift theory will hardly apply, hence the reason for this preference must for the present remain obscure. Despite abundance, its depredations do not seem to come to common notice except at long intervals and in widely separated localities, but this again may be due to the fact that the farmer attributes the injuries to other causes, and the entomologist is misled on account of its supposedly carnivorous and predaceous habits, which would place it among beneficial instead of injurious insects.

HISTORY OF ITS DEPREDATIONS.

The first record of its seed-corn-destroying habit was published by the writer in November, 1890,^a the beetles having been received under date of June 11, previous, from Whitley County, Ind., where they were reported as attacking the seed kernels in the vicinity of the germ as soon as these kernels had become softened by the action of the moisture in the soil. When this material was received one of the beetles was engaged in burrowing into a kernel after this manner. This instance for fifteen years remained the sole proof of the destructive habits of this insect in the cornfields or elsewhere.

In 1905 Prof. R. H. Pettit, of the Michigan Agricultural College, reported it as having been received about June 5 of that year, with

^a Insect Life, Vol. III, p. 159.

the complaint of its having worked serious injuries.^a In this instance it had operated about Trenton, Mich., where the insects fed upon the seed kernels, as previously observed by the writer, and they were found working in a large proportion of the hills soon after planting.

DEPREDATIONS IN THE SPRING OF 1906.

During the spring of 1906 the depredations of this little pest appear to have been unusually severe and more widespread in their distribution over the country. Aside from the cases where the destruction was definitely and unmistakably traced to this insect, there

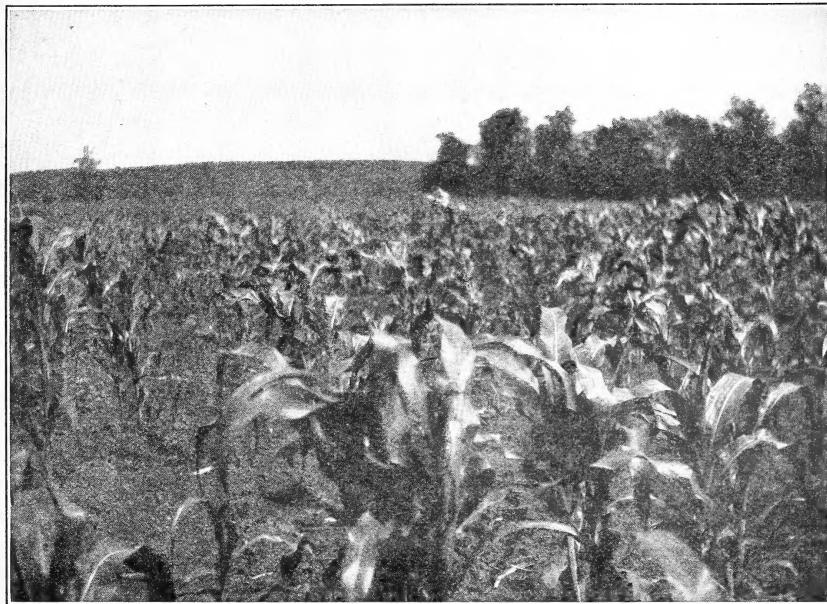


FIG. 2.—Field of corn near New Paris, Ohio, which had been devastated by *Clivina impressifrons*. Photograph taken after plants had attained considerable size (original).

were hundreds of instances where the seed corn failed to germinate and the owners of these fields could offer no explanation therefor. They knew only that they were obliged to replant much of their corn, and in many cases the replanting failed, as did the first. In such cases as these last it is of course impossible to fasten the responsibility for the destruction upon this insect, but all such fields as were examined by the writer—unfortunately too late to observe the predator—were precisely such as we would look for in searching

^a Bul. 223, Mich. State Agric. Coll. Exp. Sta., p. 50, figs. 51, 52.

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for the work of this insect—that is to say, they were low lying, flat, very moist, with soil of a darker color and of a more mellow nature. Besides, there was absolutely nothing to show that there had been any other injury except to the seed kernels, whereas, had the injury been due to wireworms, some at least of the growing plants would still have shown evidences of their work. Fields of this description, including one owned by the writer, were observed during the latter half of June, from western Pennsylvania to eastern Kansas, and many others were reported to him but not visited.

There is another beetle, *Agonoderus pallipes* Fab., of a dull yellowish color with central portion of wing covers black, which has this seed-corn-destroying habit, and it is quite possible that some of all this destruction might have been due to its work, tho this last one is common everywhere and by no means confined to lower lands; neither has it been observed to congregate in such situations.

AN OUTBREAK IN OHIO.

The ravages of the Clivini were noticed in several fields of newly planted corn near Paris, Ohio, during the first week of June, 1906, and one of the writer's assistants, Mr. W. J. Phillips, whose headquarters were at that time at Richmond, Ind., visited the locality on the 14th of the same month and reported on one of these fields as follows:

At the time of my visit the field had been replanted, and the beetles were working in the replants. I counted five beetles in one kernel and as many as twenty around one hill. They enter the kernel from the germ side and seem to eat the entire mass excepting the hull. They do not seem to trouble the corn if it has sprouted and gotten a start to growing.

The whole field contained about 40 acres, but only 10 to 15 acres were injured, and the condition of this portion of the field is shown by the accompanying photograph (see fig. 2). This was the lowest part of the field and in a rich, black soil. The portion of the field that did not seem to be troubled at all was higher up with more of a clay soil. The field is strictly bottom land and nearly always moist.

I took quite a number of the beetles and placed them in a jar of earth and put some corn in the jar. They have tunneled all thru this soil, and (August 7) I still see them occasionally.

Under date of August 29 Mr. Phillips reports a situation in the field as follows:

I have made a number of pilgrimages into Ohio for *C. impressifrons* and could not find any. Yesterday I made another trip. I planted more corn the time before while there. Yesterday I found quite a number of adult beetles, but no larvae or pupae. Adult beetles were feeding on the corn. I never find the beetles above ground, but found them as far as 8 inches below ground.

OUTBREAKS IN KANSAS.

Prof. E. A. Popenoe, of Manhattan, Kans., called the writer's attention to two reports that he had received of serious ravages from the southeastern part of his State, both accompanied by specimens of the depredators; but before this information was received from him the attention of the writer had been called to some fields about Lawrence, same State, where farmers had found it impossible to get corn to germinate. These fields were all of them low and swampy, and while in some the crop had been an almost total loss, there was nothing in the fields at that time upon which to convict the depredator except the similarity to other fields known to have been ravaged by this pest. The owners assured the writer that they knew nothing of the cause, only that corn simply would not come up on this ground this year, where before they had not experienced any such trouble.

PREVENTIVE OR REMEDIAL MEASURES.

Remedial measures, that is, such as will stop these depredations in the midst of the insect's work, hardly seem practicable. As to preventives, there has been too little opportunity to observe and experiment. That the beetle will depredate on underdrained lands seems probable, tho perhaps not so severely except during wet seasons. So far as information has been obtainable, hilled or check-rowed has suffered more than drilled corn; but this point needs to be substantiated by more and exact information based upon field observations. Clearly there is no help to be anticipated from late planting. As the beetle does not attack the seed after it has sprouted, shallow planting in cold, backward seasons would in a measure ward off injuries, because the kernels would sprout sooner than if planted deeply.

Professor Pettit has suggested^a that if seed be soaked and then rolled in dry slaked lime or plaster mixt with Paris green or some similar poison it would render the seed so treated immune. The trouble here is that seed thus treated could not be planted with the ordinary planters, but would have to be planted by hand. This would, of course, prevent its being applied at the time of the first planting, and thus offer no protection at the time when it is most needed. The seed used in replanting might be so treated, as this work is ordinarily done either with the hoe or a small hand planter.

Experiment has shown that while soaking for a few hours in kerosene may render the seed distasteful, this treatment is likely to be as uncertain in its effects as is petroleum used as an insecticide in the orchard; therefore its use in this case is not recommended. It is to

^a Loc. cit.

be hoped that farmers and others will promptly report any such outbreaks of this insect as have been observed the present year, and that entomologists will by this means be afforded a better opportunity to investigate and recommend repressive measures that can be applied in the fields by the farmers themselves.

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *October 4, 1906.*

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